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54 **A container with an inside liner**

57 Materials that are difficult to store and must be protected from air and other substances can be safely stored in a container fitted with an inside liner when the inside liner is attached at the ascending pipe in a manner that encloses it. It is thus possible to protect the material effectively from an air flow, in which case the flowthrough opening is located and arranged thus that the air passing through the flowthrough enters between the inside liner and inside wall and is thus unable to come into contact with the material stored within the inside liner.

Fig. 1

The invention concerns a container for materials that can be pumped, particularly for rock-bonding chemicals applied through an ascending pipe in mining and tunnel work, and an inside liner made of a flexible material, in which case the fitting that is screwed into a container opening has an inside opening to receive the ascending pipe and a flowthrough opening for the air.

In below-ground mining and tunnel work, chemicals are used for different purposes and particularly for the bonding of rocks, in which case the chemicals are stored separately and are then combined just before they are injected in the rock formation. These pumpable chemicals as well as other materials used above and below ground require a careful storage in containers that are sufficiently solid and can be used several times. These pumpable materials are removed from the container with the help of a tapping cock or a pump and are then piped to the area of application. More expensive materials require a so-called inliner that is screwed to the container together with the fitting, i.e., the cover. To avoid a vacuum in the container and also in the inside liner, the inside liner has a flowthrough opening through which the air can flow and replace the volume of the pumped-out material. It is a disadvantage, however, when this air flows automatically to the inliner and the stored material, in which case mixing in the upper separation layer cannot be prevented as a function of the intensity. Furthermore, contact between air and material restricts storage in these containers with inside liners to materials that do not, or just barely, react to contact with air.

Accordingly, the task of the invention consists in the development of a container with an inside liner, in which it is also possible to store substances and materials that react with air or other media.

In accordance with the invention, the task is solved by the fact that the inside liner is attached to the ascending pipe in an enclosing manner, in which case the flowthrough opening ends between the inside liner and inside wall.

On the basis of the "attachment" of the inliner to the ascending pipe, it is still possible for the vacuum formed when removing the material to be prevented by supplying an air flow. However, and in accordance with the invention, this air no longer enters the inliner, but flows between the inside liner and inside wall, thus effectively preventing the formation of a vacuum. In that regard, it is also possible to provide a check valve in the flowthrough opening and to use a compressor unit to add compressed air simultaneously with the pumping of the material, thus simplifying the pumping process accordingly and promoting the removal of the material. It is generally sufficient, however, to simply arrange the flowthrough opening in such a manner that the atmospheric air can enter the container without directly coming into contact with the material inside the liner; this is easy to achieve with a respective closing of the inliner connection at the ascending pipe.

In an appropriate design form of the invention, the ascending pipe is fitted with a collar that is located at a distance from the fitting and has an outside edge that is formed to match the inside component of a clamping ring used to close the inside liner. This design offers the advantage that the inside liner is easy to replace when this is required. The connection between ascending pipe and inliner can be easily opened with the help of the collar and clamping ring. At the same time, an effective and tight connection between ascending pipe and inside liner can be achieved, thus preventing contact between the material stored inside the inliner and the air. By installing the collar at a distance from the fitting, it can be ensured that the air flowing through the flowthrough opening enters the area between the inliner and inside wall and thus evenly fills the container and replaces the volume of the pumpable material that was pumped out of the inside liner.

In a further appropriate design, the clamping ring consists of a somewhat flexible material

and preferably of the inliner material. This presents the possibility to manufacture the clamping ring and inside liner in one piece, in which case the somewhat flexible design of the clamping ring simultaneously achieves an effective seal in this area. On the other hand, it is also possible to vulcanize the inliner jacket to the clamping ring, thus manufacturing and achieving an effective and tight seal.

When replacing the material stored in a container, the ascending pipe and inliner are generally removed as well; this presents no problems, since the clamping ring and the collar sitting on the ascending pipe have a diameter that is smaller than that of the fitting. Accordingly, it is possible to insert the ascending pipe and inside liner during the installation and removal process, in which case the separate connection or fixation of the inliner simultaneously prevents damage to the fitting at the area it is screwed-on, i.e., as has always been the case in the older design. Furthermore, this design exhibits the advantage that the inliner may be made of a more or less flexible material, since the special design permits it to be inserted into the container when it does not rest more or less tightly against the ascending pipe. Accordingly, the material selection is no longer of decisive importance and it is preferably even possible to use an inliner made of aluminum or a similar material that exhibits no flexibility at all. As indicated earlier, there exist many possibilities to attach the inside liner at the clamping ring or to connect them together to thus achieve the required tight closure against the area that contains air. Furthermore, and in accordance with the invention, there exists another possibility to attach the inliner, i.e., the inliner is clamped between the clamping ring and collar. In that arrangement, the inliner can also serve to seal the gap between the inside liner and collar when it exhibits a corresponding beaded closure or is covered correspondingly at the upper region.

To prevent from the start the completely filled container from having a volume available for the in-flowing air, i.e., without requiring the flowthrough opening, the inside liner is inserted and clamped starting at the clamping ring and collar edge facing away from the fitting. This presents the possibility to offer a correspondingly annular area right from the start that is never filled with the material, but always filled with air or possibly with another substance that, in the event of an emergency or risk, reacts with the material stored within the inside liner in such a manner that the whole container or its content are neutralized and no problems exist in the event of a fire. As a function of the material stored within the inside liner, the reaction substance stored in the collar area may consist of water or a corresponding chemical.

To prevent damage to the inliner when the fitting is screwed in possibly together with the ascending pipe, it may be appropriate to arrange the clamping ring in a rotating manner on the collar. It is also possible, of course, to arrange the collar at the ascending pipe in a rotating manner; both solutions prevent damage to the inside liner, since it remains in a fixed position and does not rotate with the ascending pipe or fitting.

Some sort of a labyrinth seal in the area of the inside liner and ascending pipe is created by the fact that the inside part of the clamping ring has two recesses and the collar has two corresponding rings. A sufficient sealing effect is thus ensured even when the clamping ring is not properly positioned, i.e., even when the inside liner is clamped between the clamping ring and collar. To effectively seal this area, it may be an advantage to fit the clamping ring with a seal in the area of the recess or recesses. This may even consist of a double seal, i.e., as a function of the value of the material stored in the inside liner and of the degree the air must be kept away. On the other hand, it is only natural that these seals also prevent the material from leaving the inside liner and penetrating the remaining container section, thus possibly causing damage.

To ensure an effective closure and also the closest-possible enclosure of the material by the inliner, it may be advantageous to design the collar such that it can be moved along the ascending pipe. Accordingly, the collar and clamping ring travel up and down the ascending pipe as a function of the material filling level within the inliner. A stop can be provided to prevent the collar and clamping ring from traveling down too far, e.g., to the area of the feed openings.

The invention is characterized particularly by the fact that it creates a container with inside liner that can be used in the most varied applications. Above all, such a container can be used to store a material that is sensitive to air or other chemicals without the risk of a vacuum forming when the material is pumped out. What is more, the flowthrough opening can be designed and constructed such that sabotage attempts remain ineffective, i.e., some hazardous material is fed to the container through the flowthrough opening. Such a material will rest on the inliner and it will never reach the stored material. In that regard, highly sensitive and particularly valuable materials that easily react with air or other chemicals can be stored in such a container and can be handled easily and safely from there, since the material is easy to remove from the container by attaching a corresponding discharge nozzle. It is only natural that this applies also to oil or gasoline that, in such an arrangement, can be safely stored in such containers without the slightest risk that parts of the material may evaporate through the flowthrough opening or collect in the inside of the container. The invention is thus characterized by substantial technical progress and can be used to advantage in mining applications and in all other applications that are subject to special safety requirements.

Further details and advantages of the object in accordance with the invention are explained with the help of the following description and the drawings showing preferred design forms with required details. The figures show the following:

Figure 1 shows a partial elevation of the container with fitting, ascending pipe and inside liner;

Figure 2 shows the connection between ascending pipe and inside liner and

Figure 3 shows different design forms for the connection between ascending pipe and inside liner.

With respect to the container wall (2), the container (1) is shown only for the area, in which the fitting (4) is screwed into a corresponding container opening (11). For that purpose, the container wall (2) and the fitting (4) are fitted with a corresponding thread (12) and the fitting (4) can thus be screwed in without problems. The inside or inside wall of the container (1) is shown as (3).

Through the container (1) is inserted an ascending pipe (5), whose bottom end is fitted with the feed openings (6); a discharge nozzle (7) arranged at the top of the fitting (4) can thus be used to easily suction the stored material out of the container. For that purpose, the fitting (4) has an inside opening (8), into which is placed the ascending pipe (5). Furthermore, the fitting (4) has a flowthrough opening (9) through which air can flow to the inside of the container (1) as indicated by the arrow when the material stored in the container (1) is suctioned out as described earlier.

The material that is not shown here and is stored in the container (1) is enclosed by the inside liner (10) that rests closely against the inside wall (3) of the container (1) when the inside liner (10) or the container (1) are full as shown in Figure 1. The arrow (13) makes it clear that the air flowing through the flowthrough opening (9) of the arrangement shown in Figure 1 enters an area between the inside wall (3) and the inside liner (10). Accordingly, the air does not come into contact with the material stored in the inside liner (10).

The inside liner (10) shown in Figure (1) is in no way attached to the container (1), but is attached directly to the ascending pipe (5). For that purpose, the ascending pipe (5) has a collar (14),

whose outside edge (15) is formed such that the clamping ring (16) with a corresponding inside part (17) can be placed on it or clamped to it. In the arrangement shown in Figure 1, the collar (14) is fitted with two rings (18, 19), while the inside part (17) of the clamping ring (16) has correspondingly formed recesses (20, 21).

In the arrangement shown in Figure 1, the inside liner (10) is vulcanized onto the outside jacket (27) of the clamping ring (16), thus forming a tight connection. This is shown in Figure 2 where the respective area is enlarged; here the inside liner (10) is formed onto the clamping ring (16) or connected to it. It also shows that it is possible to use the fixation ring (24) to create a zone that is perfectly suited for the connecting or placing, gluing or vulcanizing of the closure edge (28) of the inside liner (10).

Figure 2 shows a special design form, i.e., seals (25, 26) are provided between the collar (14) and the clamping ring (16) and effectively stop the flow of a gas, for example, out of the inside liner (10) when evaporating substances are stored in the inside liner (10). In the arrangement shown in Figure 2, the seals (25, 26) are arranged in the respective groove rings of the clamping ring (16), in which case a ring-shaped sealing groove (30) is provided at the opposite side of the collar (14) to ensure a favorable support area for the seal (25, 26).

Figure 3 shows that further possibilities exist for the connection between the clamping ring (16) and the inside liner (10), i.e., in addition to those shown in Figures 1 and 2. For example: 10' shows the clamping of the closure edge (28'), in which case the design of the clamping ring (16) ensures an effective closure and an effective connection. The same holds true for the arrangement shown as (10'''), in which the inside liner (10) is placed from the top in the area between the collar (14) and the clamping ring (16).

In a third version, the closure edge (28'') of the inside liner (10'') is placed into corresponding recess (31) at the lower edge (22) of the clamping ring (16) and is thus attached. It is also possible to provide a corresponding recess at the upper end (23) of the clamping ring (16).

By themselves and in combination, all above-mentioned features, including those that can be derived by looking at the drawing, are considered relevant for the invention.

Patent Claims

1. A container for pumpable materials and particularly for rock-bonding chemicals applied through an ascending pipe in mining and tunnel work, with an inside liner made of a flexible material, in which case the fitting that is screwed into a container opening has an inside opening to receive the ascending pipe and a flowthrough opening for the air,
characterized by the fact that
the inside liner (10) encloses the ascending pipe (5) and is attached to it, in which case the flowthrough opening (9) is arranged between the inside liner and inside wall (3).

2. A container in accordance with claim 1,
characterized by the fact that
the ascending pipe (5) is at a distance from the fitting (4) fitted with a collar (14) that has an outside edge (15) formed to match the inside part (17) of a clamping ring (16) that locks the inside liner (10).

3. A container in accordance with claim 2,
characterized by the fact that
the clamping ring (16) is made of a somewhat flexible material and preferably of the material used for the inside liner (10).

4. A container in accordance with claim 2,
characterized by the fact that
the clamping ring (16) and the collar (14) sitting on the ascending pipe (5) have the same diameter that is smaller than the diameter of the fitting (4).

5. A container in accordance with claim 1,
characterized by the fact that
the inside liner (10) is clamped between the clamping ring (16) and the collar (14).

6. A container in accordance with claim 5,
characterized by the fact that
the inside liner (10) is inserted starting at the edge (22) of the clamping ring (16) and the collar (14) that faces away from the fitting (4).

7. A container in accordance with claim 2,
characterized by the fact that
the clamping ring (16) can rotate on the collar (14).

8. A container in accordance with claim 2,
characterized by the fact that
the inside section (17) of the clamping ring (16) has two recesses (20, 21) and the collar (14) has two matching rings (18, 19).

9. A container in accordance with claim 2,
characterized by the fact that
the clamping ring (16) is fitted with a seal (25) in the area of the recess (20) or of the recesses (20, 21).

10. A container in accordance with claim 2,
characterized by the fact that
the collar (14) can slide along the ascending pipe (5).

Fig. 1

Fig. 2

Fig. 3